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# GGSIPU Mathematics 2005

1. The equation of the plane through the intersection of the planes x+y+z = 1 and 2x+3y-z+4 = 0 and parallel to x-axis is :

(a) y-3z+6 = 0 (b) 3y-z+6 = 0

(c) y+3z+6 = 0 (d) 3y-2z+6 = 0

2. The distance of the point (3,8,2) from the line $\frac{(x-1)}{2} = \frac{(y-3)}{4} = \frac{(y-2)}{3}$ measured parallel to the plane 3x+2y-2z+15 = 0 is :

(a) 2 (b) 3

(c) 6 (d) $\frac{19}{2}$

3. Let (3,4,-1) and (-1,2,3) are the end points of a diameter of sphere.Then the redius of the sphere is equal to :

(a) 1 (b) 2 (c) 3 (d) 9

4. If A,B,C,D are the points (2,3,-1),(3,5,-3),(1,2,3),(3,5,7)respectively,Then the angle between AB and CD is :

(a) $\frac{\pi}{2}$ (b) $\frac{\pi}{3}$

(c) $\frac{\pi}{4}$ (d) $\frac{\pi}{6}$

5. If u = log $\left(\frac{x^2+y^2}{x+y}\right)$, then the value of $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y}$ is :

(a) -1 (b) 0

(c) 1 (d) 2

6. A five digits number is formed by writing the digits 1,2,3,4,5 in a random order without repetitions.Then the probability that the number is divisible by 4,is :

(a)3/5 (b) 18/5

(c) 1/5 (d) 6/5

7. Two persons A and B takes turns In throwing a pair of dice.The first person to throw 9 from both dice will be awarded the price.If A throws first,then the probability that B wins the game ,is :

(a) 9/17 (b) 8/17

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(c) 8/9 (d) 1/9

8. The probability that in year of the 22nd century chosen at random,then there will be 53 Sundays,is :

(a) 3/28 (b) 2/28

(c) 7/28 (d) 5/28

9. The standard deviation of a variable x is 10.Then the standard deviation of 50+5x is :

(a) 50 (b) 550

(c) 10 (d) 0.98

10. The octal equivalent of the decimal number 0.3125 is :

(a) 0.24 (b) 0.42

(c) 0.39 (d) 0.98

11. The hexadecimal equivalent of the binary number 111100001010001 is

(a) 15C3 (b) C351

(c) 3C51 (d) C315

12. A real value of x will satisfy the equation $\left(\frac{3-4ix}{3+4ix}\right) = \alpha - I$ (~ and are real),If :

(a) $\sim^2 - {}^2 = -1$ (b) $\sim^2 - {}^2 = 1$

(c) $\sim^2 + {}^2 = 1$ (d) $\sim^2 - {}^2 = 2$

13. If ω is a complex cube root of unity,then the value of

$\frac{p+q\omega+r\omega^2}{r+p\omega+q\omega^2} + \frac{p+q\omega+r\omega^2}{q+r\omega+p\omega^2}$ (p,q,r Č R ) is equal to :

(a) 0 (b) 1

(c) -1 (d) 2

14. If P,Q,R,S are represented by the complex numbers 4 + I,1 + 6 I,-4 + 3i,-1 -2i respectively,then PQRS is a :

(a) rectangle (b) square

(c) rhombus (d) parallelogram

15. If n is a positive integer,then $(1+i)^n + (1-i)^n$ is equal to :

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(a) $(\sqrt{2})^{n-2} \cos\left(\frac{n\pi}{4}\right)$

(b) $(\sqrt{2})^{n-2} \sin\left(\frac{n\pi}{4}\right)$

(c) $\sqrt{2})^{n+2} \cos\left(\frac{n\pi}{4}\right)$

(d) $\sqrt{2})^{n+2} \sin\left(\frac{n\pi}{4}\right)$

**16. The number of ways in which 9 persons can be divided into three equal groups is :**

(a) 1680 (b) 840

(c) 560 (d) 280

**17. A dictionary is printed consisting of 7 letters words only that can be made with a letters of the word CRICKET.If the words are printed are alphabetical order is an ordinary dictionary,then the number of words are before the word CRICKET is :**

(a) 530 (b) 480

(c) 531 (d) 481

**18. If the sum of the coefficient in the expansion of $(x+y)^n$ is 1024, then the value of the greatest coefficient in the expansion is :**

(a) 356 (b) 252

(c) 210 (d) 120

**19. The value of the determinant**

$$\begin{vmatrix} 10! & 11! & 12! \\ 11! & 12! & 13! \\ 12! & 13! & 14! \end{vmatrix}$$ **is :**

(a) 2 (10 ! 11 ! ) (b) 2 (10 ! 13 !)

(b) 2 (10 ! 11 ! 12 ! ) (d) 2 (11 ! 12 ! 13 ! )

**20. If A and B are 3x3 matrices such that AB = B and BA = A,than :**

(a) $A^2 = A$ and $B^2 \div B$

(b) $A^2 \div A$ and $B^2 = B$

(c) $A^2 = A$ and $B^2 = B$

(d) $A^2 \div A$ and $B^2 \div B$

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21. If the points $(x_1,y_1),(x_2,y_2)$ and $(x_3,y_3)$ are collinear,then the rank of the matrix

$$\begin{bmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{bmatrix}$$ will always be less than :

(a) 2 (b) 3

(c) 1 (d) none of these

22. The system of equations; x+y+z = 6,x+2y+3z = 10,x+2y+ $^{a}$ z = 6 has number solution for :

(a) $^{a}$ = 3,« = 10 (b) $^{a}$ = 3,« ÷ 10

(c) $^{a}$ ÷ 3,« ÷ 10 (d) none of these

23. If A = $\begin{vmatrix} \sin(\theta+\alpha) & \cos(\theta+\alpha) & 1 \\ \sin(\theta+\beta) & \cos(\theta+\beta) & 1 \\ \sin(\theta+\gamma) & \cos(\theta+\gamma) & 1 \end{vmatrix}$ Then :

(a) A=0 for all ¯

(b) A is a odd function of ¯

(c) A=0 for ¯=~+ +¥

(d) A is a independent of ¯

24. An investigator interviewed 100 students to determine the performance of three drinks milk,coffy and tea;20 students take milk and coffee ,30 students take coffee and tea,25 students take milk and tea,12 students take milk only,5 students take coffee only and 8 students take tea only.Then the number of students who did not take any drinks any of three,is :

(a) 10 (b) 20

(c) 25 (d) 30

25. Let Y={1,2,3,4,5} , A={1,2}, B={3,4,5} and ¤ denots null set.If (AxB) denotes Cartesian product of the sets A and B,then (YxA) ą (yxB) is :

(a) Y (b) A

(b) B (d) ¤

26. let A={2,3,4,5,……..,16,17,18}.Let ù be the equivalence relation on AxA Cartesian product of A and A,defined by (a,b) ù (c,d) if ad=bc,then the number of ordered pairs of the equivalence class of (3,2) is :

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(a) 4 (b) 5 (c) 6 (d) 7

27. A question 'who have studied Physics?' was asked to three students A,B and C.The question was answered correctly as it is true that If A studied Physics,then B also studied Physics but it is false statement that if C studied Physics,then B also studied physics.Then physics was studied by :

(a) both A and B (b) only A

(c) only B (d) only C

28. If a,b be two fixed positive integers such that f(a+x)=b+[$b^3$ +1 -3$b^2$ f (x) + 3b{f x} – {f(x)]$^3$ ]$^{1/3}$ for all real x,then f(x) is a periodic function with period :

(a) a (b) 2a

(c) b (d) 2b

29. The domain of the function f(x) = $\log_3$ + x ( $x^2 - 1$) is :

(a) (-3,-1) Ć (1,ã)

(b) [-3,-1] Ć [1,ã)

(c) (-3,-2) Ć (-2,-1) Ć (1,ã)

(d) [-3,-2) Ć (-2,-1) Ć (1,ã)

30. The value of cot70$^0$+4cos 70$^0$ is :

(a) 1/$\sqrt{3}$ (b) $\sqrt{3}$

(c) 2$\sqrt{3}$ (d) ½

31. The equation of sinx+siny+sinz = -3 for 0áxá2 ®, 0áyá2 ®,0ázá2 ® has :

(a) one solution

(b) two sets of solution

(c) four sets of solution

(d) no solution

32. If ¯ = sin$^{-1}$ x+= cos$^{-1}$ x- tan$^{-1}$ x,x ñ 0 then the smallest interval in which ¯ lies is :

(a) $\frac{\pi}{2}$ á¯á$\frac{3\pi}{4}$ (b) 0á¯á$\frac{\pi}{4}$

(c) -$\frac{\pi}{4}$á¯á0 (d) $\frac{\pi}{4}$á¯á$\frac{\pi}{2}$

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33. Let A,B and C are the angles Of a plain triangle and $\tan\left(\frac{A}{2}\right)=\frac{1}{3}$,$\tan\left(\frac{B}{2}\right)=\frac{2}{3}$. Than $\tan\left(\frac{C}{2}\right)$ is equal to :

(a) 7/9 (b)2/9 (c) 1/3 (d) 2/3

34. If ~, (~÷ ) satisfies the question a cos ¯ + b sin ¯=c,then the value of $\tan\left(\frac{\alpha+\beta}{2}\right)$ is :

(a) b/a (b) c/a (c) a/b (d) c/b

35. A ray of light passing through the point (1,2) is reflected on the x-axis at a point P and passes through the point (5,3),then the abscissa of a point P is :

(a) 3 (b) 13/3

(c) 13/5 (d) 13/4

36. The equation $4x^2-24xy+11y^2=0$ represents :

(a) two parallel lines

(b) two perpendicular lines

(c) two lines through the origin

(d) a circle

37. The length of the chord joining the points in which the straight line $\frac{x}{3}+\frac{y}{4}=1$ cuts the circle $x^2+y^2=\frac{169}{25}$ is :

(a) 1 (b) 2

(c) 4 (d) 8

38. The normal to the parabola $y^2=8x$ at the point (2,4) meets the parabola against the point :

(a) (-18,-12) (b) (-18,12)

(c) (18,12) (d) (18,-12)

39. If a bar of given length moves with its extremities on two fixed straight lines at right angles,then the locus of any point on bar marked on the bar describes a/an :

(a) circle (b) parabola

(c) ellipse (d) hyperbola

40. The straight line $x+y=\sqrt{2}p$ will touch the hyperbola $4x^2-9y^2=36$ if :

(a) p2= 2 (b) $p^2=5$

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(c) $5p^2 = 2$ (d) $2p^2 = 5$

41. The function f(x) = $\frac{1-\sin x+\cos x}{1+\sin x+\cos x}$ is not defined at x=®.The value of f(®),so that f(x) is continuous at x=®,is :

(a) -1/2 (b) ½

(c) -1 (d) 1

42. If f(x)=$\sin^2$ xand the composite function g(f(x) = $^0$ sin x $^0$ ,then the function g(x) is equal to :

(a) $\sqrt{x-1}$ (b) $\sqrt{x}$

(c) $\sqrt{x+1}$ (d) - $\sqrt{x}$

43. Area of the figure bounded by the curves y= $^0$ x-1 $^0$ and y= 3 - $^0$ x $^0$ is :

(a) 1 sq. units (b) 2 sq.units

(c) 3 sq. units (d) 4 sq. units

44. Let x=$\left[\frac{a+2b}{a+b}\right]$ and y=$\frac{a}{b}$ , where a and b are positive integers.If $y^2$>2,then :

(a) $x^2$á2 (b) $x^2 < 2$

(c) $x^2$>2 (d) $x^2$ñ2

45. $\int_0^1 tan^{-1}\left(\frac{1}{x-x+1}\right)$ dx is :

(a) log 2 (b) log 2

(c) $\frac{\pi}{2}$ + log 2 (d) $\frac{\pi}{2}$ - log 2

46. The curves x=log (y+e) and y= log$\left(\frac{1}{x}\right)$ :

(a) do not meet

(b) meet at one point

(c) meet at two points

(d) meet at more than two points

47. $\lim_{x\to 0}\frac{\cos(\sin x)-1}{x^2}$ equals :

(a) 0 (b) -1

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(c) ½ (d) -1/2

48. Let $\vec{a}, \vec{b}, \vec{c}$ be three vectors from $\vec{a} \times (\vec{b} \times \vec{c}) = (\vec{a} \times \vec{b}) \times \vec{c}$ if :

(a) $\vec{b} \times (\vec{a} \times \vec{c}) = 0$ (b) $\vec{a} \times (\vec{b} \times \vec{c}) = 0$

(c) $\vec{c} \times \vec{a} = \vec{a} \times \vec{b}$ (d) $\vec{c} \times \vec{b} = \vec{b} \times \vec{a}$

49. If $\hat{i}, \hat{j}, \hat{k}$ are units vectors and $|\vec{a}| = a$, then the value of

$$\hat{i} \times \vec{a}^2 + \hat{j} \times \vec{a}^2 + \hat{k} \times \vec{a}^2 \text{ is :}$$

(a) $a^2$ (b) $3a^2$ (c) $2a^2$ (d) $4a^2$

50. If the area above the x-axis bounded by the curves $y = 2^{kx}$ and x = 0 and x = 2 is $\frac{3}{\log 2}$, then the value of k is :

(a) ½ (b) 1 (c) -1 (d) 2

51. The value of $\int_a^b \frac{x}{|x|} dx, a<b<0$ is :

(a) $-(|a| + |b|)$ (b) $(|b| - |a|)$

(c) $(|a| - |b|)$ (d) $(|a| + |b|)$

52. The value of

$$\int_{-2}^{2} \left[ p \log\left(\frac{1+x}{1-x}\right) + q \log\left(\frac{1-x}{1+x}\right)^{-2} + r \right] dx \text{ depends on:}$$

(a) The value of p
(b) The value of q
(c) The value of r
(d) The value of p and q

53. A curve having the condition that the slope of tengent at some point is two times the slope of the straight line joining the same point to the oigin of co-ordinates,is a/an :

(a) circle (b) ellipse

(c) parabola (d) hyperbola

54. If a is an arbitrary constant,then solution of differential equation

$$\frac{dy}{dx} + \sqrt{\frac{1-y^2}{1-x^2}} = 0 \text{ is :}$$

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(a) X $\sqrt{1-y^2}$ + y $\sqrt{1-x^2}$ = a

(b) y $\sqrt{1-y^2}$ + x $\sqrt{1-x^2}$ = a

(c) X $\sqrt{1-y^2}$ - y $\sqrt{1-x^2}$ = a

(d) y $\sqrt{1-y^2}$ - x $\sqrt{1-x^2}$ = a

55. A particle is moving along the curve x=a $t^2$ + b t + c.If a c = $b^2$,then the particle would be moving with uniform :

(a) rotation (b) velocity

(c) acceleration (d) retardation

56. The solution of the equation $x^2\frac{d^2y}{dx^2}$ = log x when x=1,y=0 and $\frac{dy}{dx}$=-1 is :

(a) $\frac{1}{2}$(log x)$^2$ + log x

(b) $\frac{1}{2}$(log x)$^2$ - log x

(c) - $\frac{1}{2}$(log x)$^2$ + log x

(d) - $\frac{1}{2}$(log x)$^2$ - log x

57. Let the unit vectors $\vec{a}$ and $\vec{b}$ be the perpendicular to each other and the unit vector $\vec{c}$ be inclined at an angle ¯ to both $\vec{a}$ and $\vec{b}$.If $\vec{c}$ = ~ $\vec{a}$ + $\vec{b}$ + ¥ ($\vec{a}$.$\vec{b}$), where ~, ,¥ are scalars,then :

(a) ~=cot ¯, =sin ¯,¥$^2$=cos 2 ¯

(b) ~=cos ¯, =cos ¯,¥$^2$=cos 2 ¯

(c) ~=cos ¯, =sin ¯,¥$^2$=cos 2 ¯

(d) ~=sin ¯, =cos ¯,¥$^2$= - cos 2 ¯

58. If y = $\frac{1}{\sqrt{a^2-b^2}}$ $\cos^{-1}\left[\frac{a\cos(x-a)+b}{a}\right]$ where ¯ = a+b cos(x-~),then $\frac{dy}{dx}$ is equal to :

(a) 1/¯ (b) 2/¯

(c) 1/¯$^2$ (d) 2/¯$^2$

59. Let K be a set of real number and f:K → R such that for all x any y $^0$ f(x) – f(y) $^0$ á $^0$ x-y $^{05}$. If f(3) = 7, then the value of f(9) is equal to

(a) 5 (b) 7

(c) 9 (d) 11

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60. If $f(x) = \frac{1}{1-x}$ then the darrivative of the composite function f [ f { f(x) } ] is equal to :

(a) 0 (b) ½

(c) 1 (d) 2

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